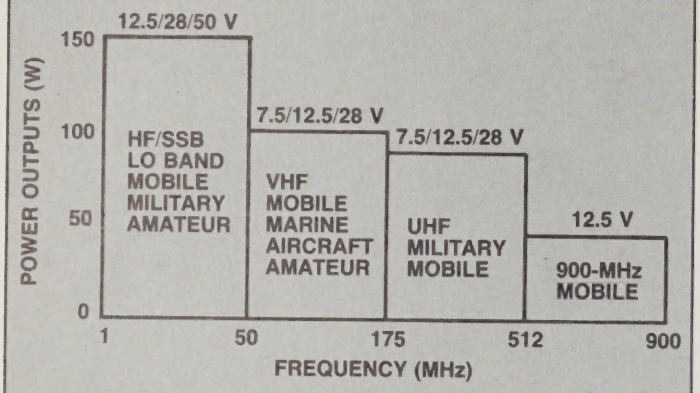
MOTOROLA Semiconductor Products Inc.

RF

Selector Guide & Cross Reference

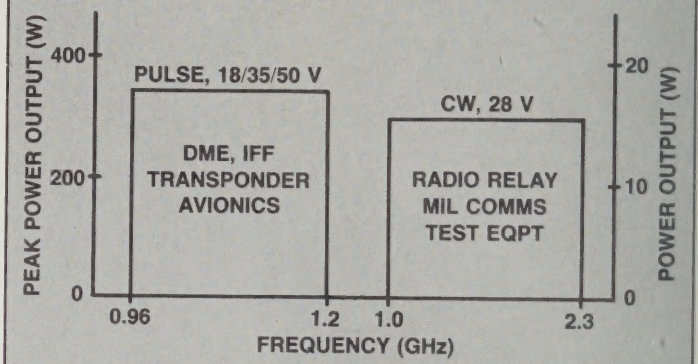
A broad line of semiconductors for the transmission and reception of RF Signals

POWER TRANSISTORS



Motorola's RF Power Transistors are categorized according to the application and frequency band for which each type is optimized. Outputs up to 150 watts are available, suitable for commercial, military, ground, airborne, and marine use from 1.5 MHz to 1 GHz.

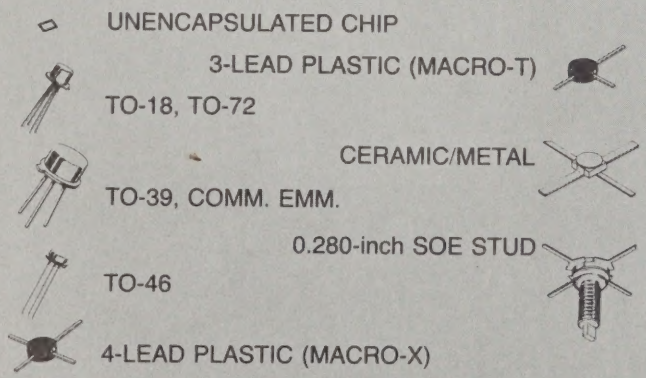
MICROWAVE POWER TRANSISTORS



The Motorola line of microwave power transistors are engineered for ruggedness and consistency of performance from unit to unit, lot to lot. Gold metal systems and silicon nitride passivation ensure reliability. Both hermetic and organic sealed packages provide cost effective options to suit the end-use environment. Internal input/output impedance matching elements facilitate broadband designs.

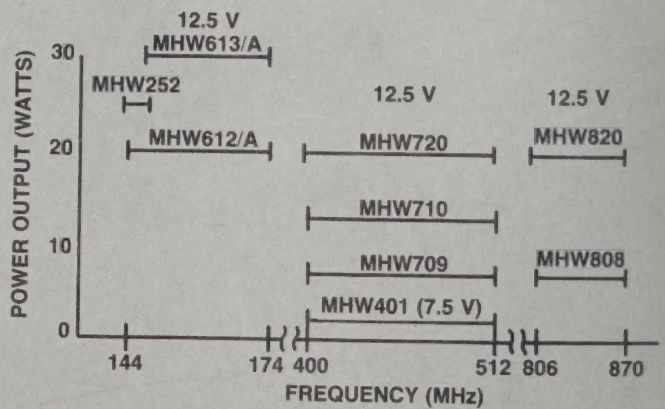
SMALL-SIGNAL/LOW-NOISE

f_T's TO 6 GHz AND ALL THE PACKAGES



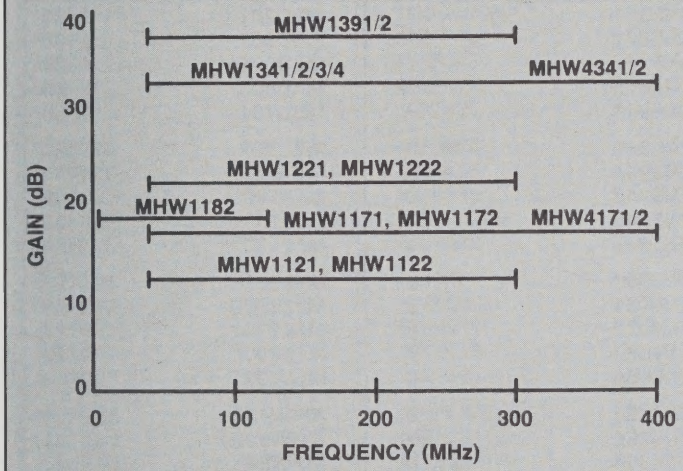
Small-signal high-frequency transistors from Motorola are characterized as low-noise amplifiers, oscillators, high-speed switches and class A linear amplifiers. Manufacturing processes include ion-implanted arsenic emitters and gold metallization. Packaging options include plastic/ceramic stripline, metal can, and unencapsulated chips to suit performance and cost requirements.

POWER HYBRID MODULES

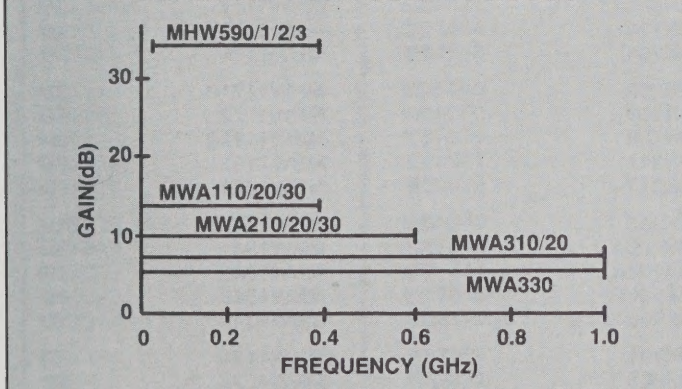


Power Hybrid Modules are self-contained Power Amplifiers which provide a pre-engineered, functional performance-tested alternative to the use of individual power transistors. Producing VHF/UHF power outputs up to 30 W, these modules offer field-replaceable, consistent performance, and tolerance to load mismatch.

...Motorola's Supermarket Of RF Semiconductors



Linear Hybrid Modules offer broadband small-signal amplification where low distortion, gain stability and high reliability are demanded. They are designed for the stringent requirements of the CATV/MATV markets.



The MHW590/1/2/3 are derivatives of the CATV module family and offer two frequency ranges, 1.0-250 MHz/10-400 MHz, and two operating voltages, 13.6/24 V. They are suitable for operation in 50 to 100 Ω systems.

The MWA wideband amplifiers in TO-39 packages provide a cost-effective alternative to complex feedback designs using discrete transistors. Consistent performance and unconditional stability of the MWA's take the pain out of broadband high-gain circuit design.

*TM MOTOROLA

In many Supermarkets, you might not find help until you reach the checkout counter. Not so at Motorola's RF Semiconductor Supermarket — there's extensive service, including highly informative Designer's Data Sheets,* Application literature, and design-in assistance by Motorola application engineers in Phoenix, Geneva, and Munich. The new RF Data Manual, which may be purchased from Motorola distributors, is a heavyweight compendium of device data and practical application information.

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NUMERIC INDEX

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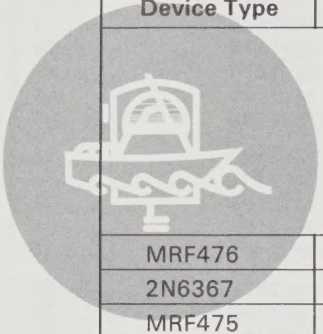
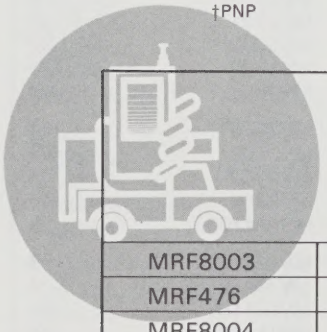
LOW-VOLTAGE POWER TRANSISTORS AND MODULES

The transistors listed in these tables are specified for operation in RF Power amplifiers and are listed by specific application at a given test frequency. Arrangement within each application group is in the order of increasing output power. Modulation type is given in each application heading. All devices are NPN polarity except where otherwise noted.



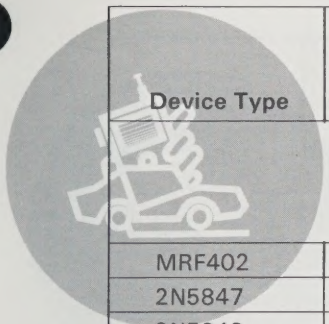
Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
1.5-30 MHz HF/SSB TRANSISTORS Designed for broadband operation, these devices feature emitter ballast resistors and guaranteed Intermodulation Distortion at rated power output. The higher power devices are tested for ruggedness at 30:1 loaded VSWR. Applications include mobile, marine, fixed station, and amateur HF/SSB equipment.					
MRF476	0.1	3.0 PEP	15	12.5	TO-220
2N6367	0.36	9.0 PEP	14	12.5	211-07
MRF475	1.2	12 PEP	10	13.6	TO-220
MRF432*†	0.125	12.5 PEP	20	12.5	211-07
MRF433*	0.125	12.5 PEP	20	12.5	211-07
MRF479	1.5	15 PEP	10	12.5	TO-220
MRF406	1.25	20 PEP	12	12.5	211-07
MRF477	1.25	40 PEP	15	12.5	TO-220
MRF460	2.5	40 PEP	12	12.5	211-11
MRF412	3.5	70 PEP	13	13.6	211-11
MRF412A	3.5	70 PEP	13	13.6	145A-10
MRF421	10	100 PEP	10	12.5	211-08

*PNP/NPN Complements for Complementary Symmetry Amplifier, See EB-32.
†PNP



14-30 MHz, CB/AMATEUR TRANSISTORS These HF, emitter-ballasted transistors are designed for economical, high-volume use in CW, AM and SSB operation.					
MRF8003	0.05	0.5	10	12.5	TO-39
MRF476	0.10	3.0	15	12.5	TO-220
MRF8004	0.35	3.5	10	12.5	TO-39
MRF475	0.40	4.0	10	13.6	TO-220
MRF449	1.9	30	12	13.6	211-07
MRF449A	1.9	30	12	13.6	145A-09
MRF450	4.0	50	11	13.6	211-09
MRF450A	4.0	50	11	13.6	145A-09
MRF453	3.0	60	13	12.5	211-11
MRF453A	3.0	60	13	12.5	145A-10
MRF455	3.0	60	13	12.5	211-07
MRF455A	3.0	60	13	12.5	145A-09
MRF458	5.0	80	12	12.5	211-11
MRF458A	5.0	80	12	12.5	145A-10
MRF454	5.0	80	12	12.5	211-11
MRF454A	5.0	80	12	12.5	145A-10

LOW-VOLTAGE POWER TRANSISTORS AND MODULES (continued)

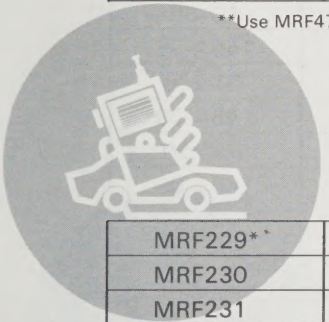


27-50 MHz, LOW-BAND FM TRANSISTORS

For use in the FM "Low-Band," for longer-distance Mobile communications.

Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
MRF402	0.1	1.0	10	12.5	TO-39
2N5847	0.8	8.0	10	12.5	145A-09
2N5848	3.22	20	8.0	12.5	145A-09
2N5849	7.14	40	7.5	12.5	145A-10
MRF497**	4.0	40	10	12.5	TO-220
MRF492	5.6	70	11	12.5	211-11
MRF492A	5.6	70	11	12.5	145A-10

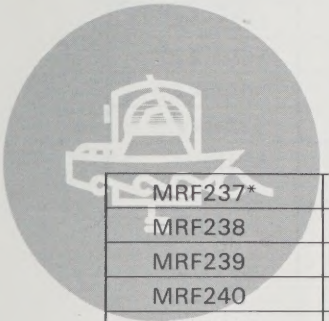
**Use MRF479 for TO-220 Driver.



66-88 MHz, MIDBAND FM TRANSISTORS

Power output chains up to 25 watts output are obtainable in the international VHF FM "Mid-Band" for which these transistors are optimized.

MRF229**	0.15	1.5	10	12.5	TO-39
MRF230	0.15	1.5	10	12.5	TO-39
MRF231	0.15	3.5	10	12.5	145A-09
MRF232	0.95	7.5	9.0	12.5	145A-09
MRF233	1.5	15	10	12.5	145A-09
MRF234	2.8	25	9.5	12.5	145A-10



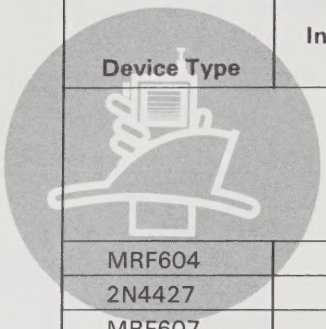
156-162 MHz, VHF MARINE RADIO FM TRANSISTORS/MODULES

An option is provided between discrete 2-stage transistor lineups to 40 watts, or a power hybrid module, for VHF Marine use.

MRF237*	0.25	4.0	12	12.5	TO-39
MRF238	3.75	30	9.0	13.6	145A-09
MRF239	3.0	30	10	13.6	145A-09
MRF240	5.0	40	9.0	13.6	145A-09
MHW613	0.3	30	20	12.5	301A-03

*Grounded Emitter TO-39 Package. See EB-29.

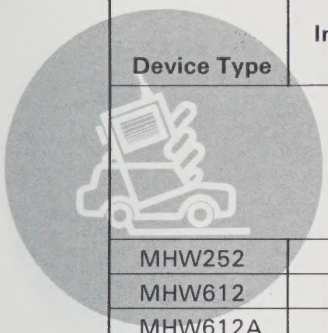
LOW-VOLTAGE POWER TRANSISTORS AND MODULES (continued)



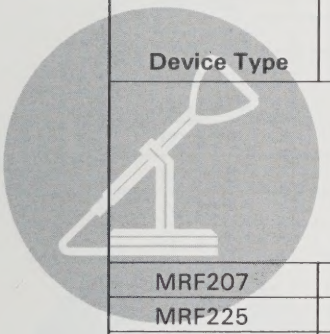
Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
136–174 MHz, HIGH-BAND/VHF FM TRANSISTORS The "workhorse" VHF FM High-Band is served by Motorola with the broadest range of devices and package combinations in the industry.					
MRF604	0.1	1.0	10	12.5	TO-46
2N4427	0.1	1.0	10	12	TO-39
MRF607	0.12	1.75	11.5	12.5	TO-39
2N6255	0.5	3.0	7.8	12.5	TO-39
2N5589	0.44	3.0	8.2	13.6	144B-05
MRF237*	0.25	4.0	12	12.5	TO-39
2N6080	0.25	4.0	12	12.5	145A-09
MRF260	0.5	5.0	10	12.5	TO-220
2N5590	3.0	10	5.2	13.6	145A-09
MRF261	3.0	10	5.2	12.5	TO-220
MRF212	1.25	10	9.0	12.5	145A-09
2N6081	3.5	15	6.3	12.5	145A-09
MRF221	3.5	15	6.3	12.5	211-07
MRF262	3.5	15	6.3	12.5	TO-220
MRF215**	3.0	20	8.2	12.5	316-01
2N5591	9.0	25	4.4	13.6	145A-09
2N6082	6.0	25	6.2	12.5	145A-09
MRF222	6.0	25	6.2	12.5	211-07
2N6083	8.1	30	5.7	12.5	145A-09
MRF223	8.1	30	5.7	12.5	211-07
MRF264	9.1	30	5.2	12.5	TO-220
MRF239	3.0	30	10	13.6	145A-09
2N6084	14.3	40	4.5	12.5	145A-09
MRF224	14.3	40	4.5	12.5	211-07
MRF216**	8.5	40	6.7	12.5	316-01
MRF240	5.0	40	9.0	13.6	145A-09
MRF250	18.0	50	4.4	12.5	211-11
MRF250A	18.0	50	4.4	12.5	145A-10
MRF247**	15	75	7.0	12.5	316-01
MRF245**	18.2	80	6.4	12.5	316-01

*Grounded Emitter TO-39 Package, See EB-29.
**Controlled "Q" Transistor.

LOW-VOLTAGE POWER TRANSISTORS AND MODULES (continued)



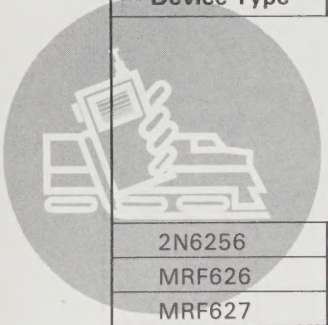
Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	f Frequency MHz	G_P Power Gain dB Min	V_{DC} Supply Voltage Volts	Package
146–174 MHz, HIGH-BAND/VHF FM MODULES Hybrid Power Amplifier Modules offer guaranteed subsystem performance, reduced production testing and simplified field maintenance. Thin-film hybrid construction insures consistent performance and reliability.						
MHW252	0.3	25	144–148	19.2	13.6	301A-03
MHW612	0.2	20	146–174	20	12.5	301A-03
MHW612A	0.2	20	146–174	20	12.5	297-03
MHW613	0.3	30	150–174	20	12.5	301A-03
MHW613A	0.3	30	150–174	20	12.5	297-03



Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
225 MHz, AMATEUR FM TRANSISTORS Specifically designed and characterized for the 225-MHz band, these devices eliminate the guesswork required when adapting 175 MHz characterized devices to this application.					
MRF207	0.15	1.0	8.2	12.5	TO-39
MRF225	0.18	1.5	9.0	12.5	TO-39
MRF227*	0.13	3.0	13.5	12.5	TO-39
MRF208	0.1	10	10	12.5	145A-09
MRF226	1.6	13	9.0	12.5	145A-09
MRF209	9.1	25	4.4	12.5	145A-09

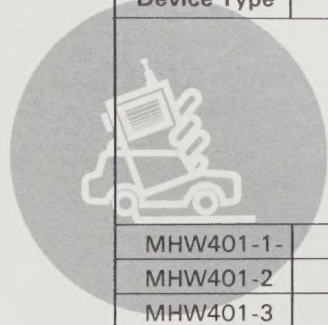
*Grounded Emitter TO-39 Package. See EB-29.

LOW-VOLTAGE POWER TRANSISTORS AND MODULES (continued)



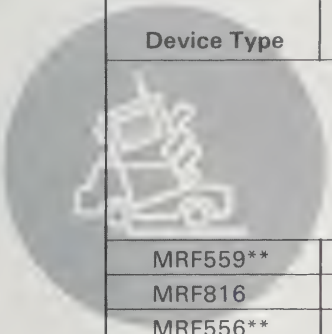
Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
407–512 MHz, UHF FM TRANSISTORS Higher power output devices in this UHF power transistor series feature Controlled Q (CQ) internally input-matched construction, are designed for broadband operation, and have guaranteed ruggedness under output mismatch and RF overdrive conditions. Automatically programmed wirebonding of CQ transistors assures consistent, wideband input impedance.					
2N6256	0.10	0.5	7.0	12.5	249-05
MRF626	0.05	0.5	10	12.5	305-01
MRF627	0.05	0.5	10	12.5	305A-01
MRF628	0.05	0.5	10	12.5	249-05
MRF515	0.12	0.75	8.0	12.5	TO-39
MRF554†	0.063	1.0	12	12.5	317-01
2N3948	0.25	1.0	6.0	13.6	TO-39
2N5644	0.20	1.0	7.0	12.5	145A-09
MRF629*	0.32	2.0	8.0	12.5	TO-39
2N5944	0.25	2.0	9.0	12.5	244-04
2N5945	0.64	4.0	8.0	12.5	244-04
MRF660	2.0	7.0	5.4	12.5	TO-220
2N5946	2.5	10	6.0	12.5	244-04
MRF641**	3.75	15	7.8	12.5	316-01
MRF644**	5.9	25	6.2	12.5	316-01
MRF646**	13.3	40	4.8	12.5	316-01
MRF648**	22	60	4.4	12.5	316-01

*Grounded Emitter TO-39 Package. Case 79-03.
**Controlled "Q" Transistor.
†To be introduced.



Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	f Frequency MHz	G_P Power Gain dB Min	V_{DC} Supply Voltage Volts	Package
407–512 MHz, UHF FM MODULES UHF Modules reduce costs of assembly, testing, inventory and maintenance, while producing consistent performance free of the critical physical design problems associated with these frequencies. Like their VHF counterparts, their consistency and reliability stem from the use of thin-film gold metallization, laser-trimmed nichrome resistors and MOS capacitors.						
MHW401-1-	0.047	1.5	400–440	15	7.5	301-01
MHW401-2	0.047	1.5	440–470	15	7.5	301-01
MHW401-3	0.047	1.5	470–512	15	7.5	301-01
MHW709-1	0.10	7.5	400–440	18.8	12.5	700-03
MHW709-2	0.10	7.5	440–470	18.8	12.5	700-03
MHW709-3	0.10	7.5	470–512	18.8	12.5	700-03
MHW710-1	0.15	13	400–440	19.4	12.5	700-03
MHW710-2	0.15	13	440–470	19.4	12.5	700-03
MHW710-3	0.15	13	470–512	19.4	12.5	700-03
MHW720-1	0.15	20	400–440	21	12.5	700-03
MHW720-2	0.15	20	440–470	21	12.5	700-03

LOW-VOLTAGE POWER TRANSISTORS AND MODULES (continued)



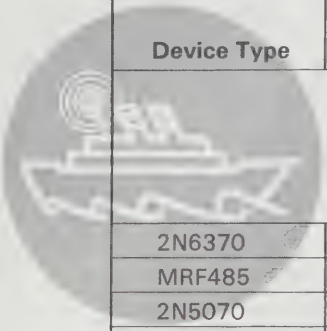
Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
806-870 MHz, UHF FM TRANSISTORS Designed specifically for the 800 MHz mobile radio band, types MRF840 through 846 offer superior gain and ruggedness, using the unique CS-12 package, which minimizes common-element impedance, and thus maximizes gain and stability.					
MRF559**	0.063	0.50	9.0	12.5	317-01
MRF816	0.075	0.75	10	12.5	249-05
MRF556**	0.16	1.0	8.0	12.5	317-01
MRF838	0.22	1.0	6.5	12.5	305A-01
MRF838A	0.22	1.0	6.5	12.5	305-01
MRF817	0.59	2.5	6.2	13.6	244-04
MRF870	1.0	3.0	5.0	12.5	305A-01
MRF870A	1.0	3.0	5.0	12.5	305-01
MRF840*	2.5	10	6.0	12.5	319-03
MRF842*	5.0	20	6.0	12.5	319-03
MRF844*	9.0	30	5.2	12.5	319-03
MRF846*	15	40	4.3	12.5	319-03

*Common Base **To be introduced.

Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	f Frequency MHz	G_P Power Gain dB Min	V_{DC} Supply Voltage Volts	Package
806-870 MHz, UHF FM MODULES The cost saving reproducability and packaging density advantages of broadband hybrid amplifier modules become very attractive in the 800 MHz mobile band. Bandwidth, stability and ruggedness are guaranteed together with the long established reliability of thin film hybrid construction.						
MHW808	0.25	7.5	806-870	14.8	12.5	297A-03
MHW820	0.25	20	806-870	19.0	12.5	301B-01

HIGH-VOLTAGE POWER TRANSISTORS

The transistors listed in these tables are specified for operation in RF Power amplifiers and are listed by specific application at a given test frequency. Arrangement within each application group is in the order of increasing output power. Modulation type is given in each application heading. All devices are NPN polarity except where otherwise noted.

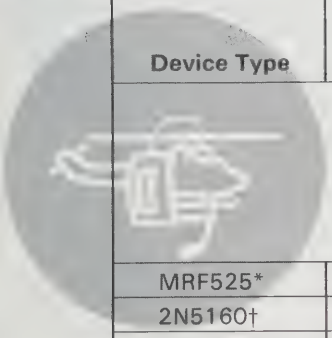


Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
1.5-30 MHz HF/SSB TRANSISTORS These broadband devices offer guaranteed Intermodulation Distortion and ruggedness in military and commercial HF/SSB fixed, mobile and marine transmitters, operating from 28 or 50 volts.					
2N6370	0.62	10 PEP	12	28	211-07
MRF485	1.5	15 PEP	10	28	TO-220
2N5070	1.25	25 PEP	13	28	TO-60
MRF401	1.25	25 PEP	13	28	145A-09
MRF426	0.16	25 PEP	22	28	211-07
MRF426A	0.16	25 PEP	22	28	145A-09
MRF427A	0.40	25 PEP	18	50	145A-10
MRF486	1.25	40 PEP	15	28	TO-220
MRF466	1.25	40 PEP	15	28	211-09
MRF463	2.53	80 PEP	15	28	211-10
MRF464	2.53	80 PEP	15	28	211-11
MRF464A	2.53	80 PEP	15	28	145A-10
MRF422	15	150 PEP	10	28	211-08
MRF428	7.5	150 PEP	13	50	211-08
MRF428A	7.5	150 PEP	13	50	307-01

30-200 MHz, VHF AM/FM TRANSISTORS Designed for Military Radio and Commercial Aircraft VHF bands, these 28-volt devices include the all-gold metalized MRF314/15/16/17 high-reliability series.					
2N3866	0.1	1.0	10	28	TO-39
2N3553	0.25	2.5	10	28	TO-39
2N5641	1.0	7.0	8.4	28	144B-05
MRF340	0.4	8.0	13	27	TO-220
2N5642	3.0	20	8.2	28	145A-09
MRF342	1.9	24	11	27	TO-220
MRF314	3.0	30	10	28	211-07
MRF314A	3.0	30	10	28	145A-09
2N5643	6.9	40	7.6	28	145A-09
MRF315	5.7	45	9.0	28	211-07
MRF315A	5.7	45	9.0	28	145A-09
MRF344	15	60	6.0	27	TO-220
MRF316**	8.0	80	10	28	316-01
MRF317**	12.5	100	9.0	28	316-01

**Controlled "Q" Transistor.

HIGH-VOLTAGE POWER TRANSISTORS (continued)



Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
225–400 MHz, UHF AM TRANSISTORS Stringent requirements of the UHF Military band are met by MRF313, 321, 331, 325, 326, 327, 328 and 2N6439 types, with all-gold metal systems, ruggedness, and "CQ" programmed wirebond construction, to assure consistent input impedances.					
MRF525*	0.001	0.02	13	26	TO-39
2N5160†	0.16	1.0	8.0	28	TO-39
2N3866	0.1	1.0	10	28	TO-39
MRF313	0.03	1.0	15	28	305A-01
MRF313A	0.03	1.0	15	28	305-01
MRF5174	0.125	2.0	12	28	244-04
MRF321**	0.62	10	12	28	244-04
MRF331#	1.6	10	8.0	28	244-04
MRF323**	2.0	20	10	28	244-04
MRF5177	7.5	30	6.0	28	215-02
MRF5177A	7.5	30	6.0	28	145A-09
MRF325**	4.3	30	8.5	28	316-01
MRF326**	8.0	40	9.0	28	316-01
MRF309***	10	50	7.0	28	316-01
2N6439††	10	60	7.8	28	316-01
MRF327**	14.9	80	7.3	28	316-01
MRF328**	20	100	7.0	28	739-01

*Grounded Emitter TO-39, Case 79-03.
**Controlled "Q" Transistor.
***420–450 MHz Amplifier. See EB-67.
#See EB-74.
†PNP — Complement to 2N3866.
††See EB-77.

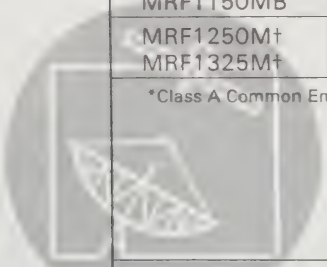
MICROWAVE POWER TRANSISTORS

Motorola's line of silicon NPN microwave power transistors includes 2.0 GHz CW devices with power outputs to 16 W and pulsed power outputs to 325 W in the 960–1215 MHz avonics band. The products feature compatibility with industry standard types, all gold metallization systems, silicon-nitride passivation and guaranteed ruggedness to withstand load impedance mismatch.

New product development is a continuous investment by Motorola to better serve in microwave power transistors demands; should your application not be satisfied by the devices listed, please contact the local Motorola Sales Office or Distributor with your specific requirement.

Device Type	P_{in} Input Power Watts	P_{out} Output Power Watts	G_{PB} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
AVONICS PULSED POWER MICROWAVE TRANSISTORS These products are designed to operate in short pulse width, 10 μs, low duty cycle, 1%, power amplifiers operating in the 960 to 1215 MHz band. The prime application is avionics equipment for distance measuring (DME), area navigation (TACAN) and interrogation (IFF).					
MRF1000MA*	0.02	0.20	10	18	332-01
MRF1000MB*	0.02	0.20	10	18	332A-01
MRF1002MA	0.20	2.0	10	35	332-01
MRF1002MB	0.20	2.0	10	35	332A-01
MRF1004MA	0.40	4.0	10	35	332-01
MRF1004MB	0.40	4.0	10	35	332A-01
MRF1008MA	0.80	8.0	10	50	332-01
MRF1008MB	0.80	8.0	10	50	332A-01
MRF1015MA	1.5	15	10	50	332-01
MRF1015MB	1.5	15	10	50	332A-01
MRF1035MA	3.5	35	10	50	332-01
MRF1035MB	3.5	35	10	50	332A-01
MRF1090MA	9.0	90	10	50	332-01
MRF1090MB	9.0	90	10	50	332A-01
MRF1150MA	25	150	7.8	50	332-01
MRF1150MB	25	150	7.8	50	332A-01
MRF1250M†	—	250	6.0	50	336-01
MRF1325M†	—	325	6.0	50	336-01

*Class A Common Emitter. †To be introduced.



1.7-2.3 GHz BROADBAND POWER MICROWAVE TRANSISTORS

The MRF2000M Series of transistors have internal input impedance matching networks which facilitate broadband circuit designs in the 1.7 to 2.3 GHz telecommunications band. The devices are designed for Class B and C common base amplifier applications.

MRF2001M	0.14	1.0	8.5	24	337-02
MRF2003M	0.48	3.0	8.0	24	337-02
MRF2005M	0.89	5.0	7.5	24	337-02
MRF2010M	2.0	10	7.0	24	337-02
MRF2016M	3.6	16	6.5	24	337-02

2 GHz MICROWAVE POWER TRANSISTORS

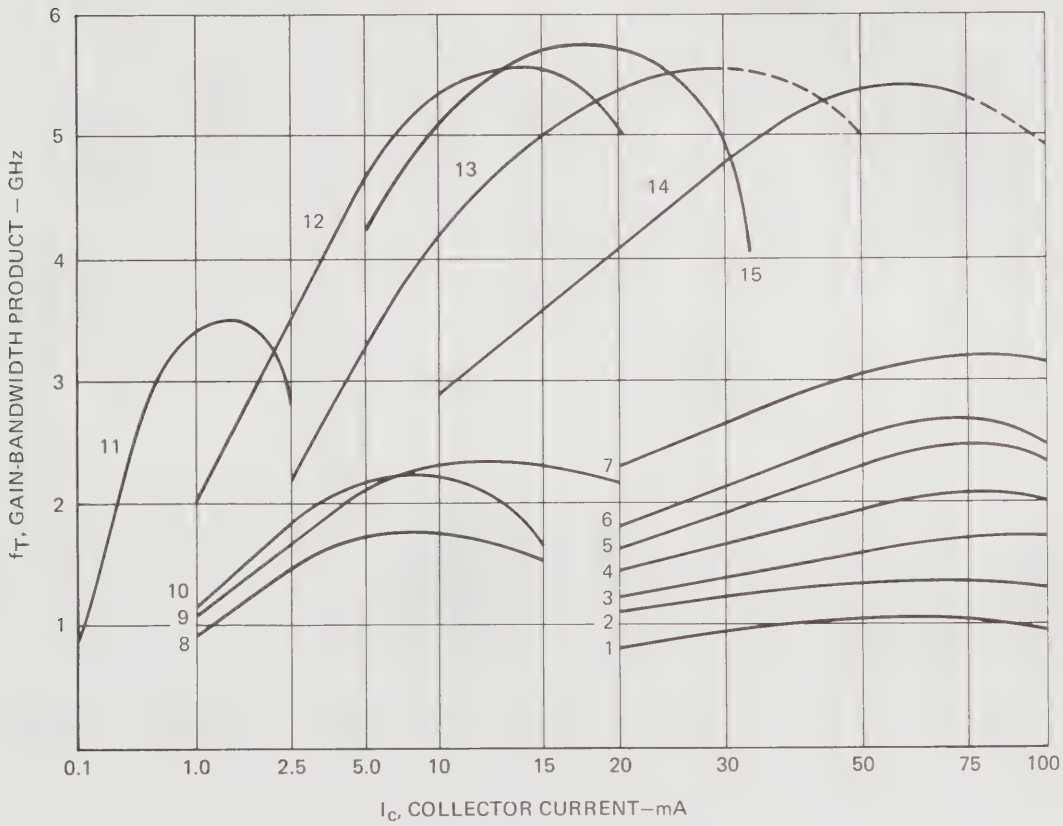
The MRF2000 Series of NPN Silicon microwave power transistors are designed for common base service in amplifier or oscillator applications in the 1.0 to 2.3 GHz frequency range. Construction techniques feature hermetic flange/pill packages and gold metallized, emitter ballasted die for long life and resistance to metal migration.

MRF2001	0.13	1.0	9.0	28	328A-01
MRF2001B	0.13	1.0	9.0	28	328-01
MRF2003	0.5	3.0	7.8	28	328A-01
MRF2003B	0.5	3.0	7.8	28	328-01
MRF2005	0.8	5.0	8.0	28	328A-01
MRF2005B	0.8	5.0	8.0	28	328-01
MRF2010	2.5	10	6.0	28	328A-01
MRF2010B	2.5	10	6.0	28	328-01

SMALL-SIGNAL RF TRANSISTORS

Motorola small-signal and medium power RF transistors with gain-bandwidth products from 1 GHz to 6 GHz operate with currents from 0.25 mA to over 100 mA. The following chart, combined with the tables of package options, enables the circuit designer to select the optimum device from Motorola's wide range of transistor/package combinations.

Typical Gain-Bandwidth Product versus Collector Current



1	2N3866, 2N3866A, MM8000
2	2N5160, MM4018, PNP
3	2N3948, 2N4427, MRF207
4	2N5109, 2N5943, MM8001, MM8002
5	2N5583, PNP
6	2N5836, 2N5837
7	MRF511, MRF517, MRF525
8	2N2857, 2N3839, 2N5179, MRF501, MRF502
9	2N6304, 2N6305, BFX89, BFY90
10	2N4957, 2N4958, 2N4959, PNP
11	MRF931
12	2N6603, BFR90, MRF901, MRF902, MRF904
13	2N6604, BFR91, MRF911, MRF912, MRF914
14	BFR96, MRF961, MRF962, MRF965
15	BFW92A

UHF and Microwave Oscillators

The transistors listed below are for UHF and microwave oscillator applications as initial signal sources or as output stages of limited range transmitters. Devices are listed in order of increasing output power.

Device Type	Test Conditions		P_{out} mW Min	f_T MHz Typ	Package
	f MHz	V_{CC} Volts			
2N5179	500	10	20	1800	TO-72
2N2857	500	10	30	1800	TO-72
2N3839	500	6.0	30	1800	TO-72
MM8009	1680	20	200	1400	TO-39
2N5108	1680	20	300	1400	TO-39
MRF905	1680	20	500*	2200	TO-46
2N3866	400	15	1000	1000	TO-39

*Typical

Low-Noise Transistors

The low-noise devices listed are produced with carefully controlled r_b' and f_T to optimize device noise performance. Devices listed in the matrix are classified according to noise figure performance versus frequency.

NF dB	Frequency MHz						Polarity
	60	100	200	450	1000	2000	
1.5	2N5829 2N5031	2N5829 2N5031	 MRF904				PNP NPN
2.0	2N4957 2N5032	2N4957 2N5032	2N5829 2N5031	 MRF904	 MRF901		PNP NPN
2.5	2N4958 2N5032	2N4958 2N5032	2N4957 2N5032	2N5829 2N5031	 MRF901 2N6603		PNP NPN NPN
3.0	2N4959 2N2857	2N4959 2N2857	2N4958 2N5032	2N4957 2N5032	2N5829 MRF901 2N6604	 2N6603	PNP NPN NPN
3.5	2N4959 2N5179	2N4959 2N5179	2N4959 2N2857	2N4958 2N5032	2N4957 2N5031	 MRF901	PNP NPN
4.0	2N4959 2N5179	2N4959 2N5179	2N4959 2N5179	2N4959 2N2857	2N4958 2N5031	 2N6604	PNP NPN
4.5	2N4959 2N5179	2N4959 2N5179	2N4959 2N5179	2N4959 2N2857	2N4959 2N5032		PNP NPN

High-Speed Switches

The transistors listed below are for use as high-frequency current-mode switches. They are also suitable for RF amplifier and oscillator applications. The devices are listed in ascending order of collector current.

Device Type	Test Conditions I_C/V_{CE} mA/Volts	f_T MHz Min	$r_b'C_c$ Max	Package
MD4957*	2.0/10	1000	20	TO-78
2N3959	10/10	1300	25	TO-18
2N3960	10/10	1600	40	TO-18
2N5835	10/6.0	2500	5.0**	TO-72
MM4049*	20/5.0	4000	15	TO-72
MRF914	20/10	4500**	–	TO-72
2N5842	25/4.0	1700	40	TO-72
2N5841	25/4.0	2200	25	TO-72
2N5943	50/15	1200	5.5**	TO-39
2N5583*	50/10	1000	8.0**	TO-39
2N5836	50/6.0	2000	6.0**	TO-46
2N5837	100/3.0	1700	6.0**	TO-46

NOTE: MD4957 is a dual transistor
*PNP **Typ

CATV, MATV, and Class A Linear Transistors

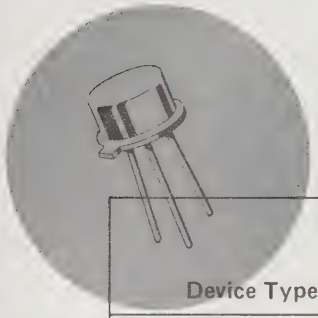
The devices listed below are excellent for Class A linear CATV/MATV applications and are listed according to increasing gain-bandwidth (f_T). More information concerning the device for your specific linear design needs can be obtained through your local Motorola Sales Office or Motorola distributor.

Device Type	Nominal Test Conditions V_{CE}/I_C Volts/mA	f_T MHz Min	Noise Figure	Distortion Specifications				Package
			Max/Freq. dB/MHz	2nd Order IMD	3rd Order IMD	12 Ch. Cross-Mod.	Output Level dBmV	
MRF501	6/5	600	4.5*/200					TO-72
MRF502	6/5	800	4.0*/200					TO-72
2N5179	6/5	900	4.5/200					TO-72
BFY90	5/2	1000	5.0/500					TO-72
2N6305	5/10	1200	5.5/450					TO-72
BFX89	5/25	1200	6.5/500					TO-72
2N5109	15/50	1200	3.0*/200					TO-39
2N5943	15/50	1200	3.4/200	-50		-42	+50	TO-39
2N6304	5/10	1400	4.5/450					TO-72
MRF511	20/80	1500	7.3*/200	-50	-65	-57	+50	144D-06
MRF517	15/60	2200	7.5/300	-60	-72	-57	+45	TO-39
BFW92A	5/2	4500*	3.0*/500					317A-01
BFR90	10/14	5000*	2.4*/500					317A-01
BFR91	5/35	5000*	1.9*/500					317A-01
BFR96	10/50	5000*	3.0*/500					317A-01
MRF961	10/50	5000*	2.0*/500					317-01
MRF962	10/50	5000*	2.0*/500					303-01
MRF965	10/50	5000*	2.0*/500					TO-46

* Typ

Small-Signal Amplifier Transistor Selection by Package

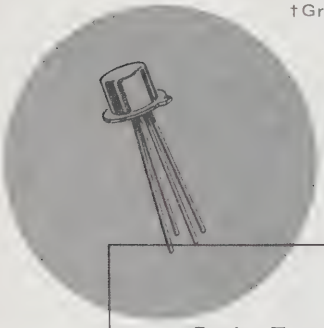
In small-signal RF applications the package style is often determined by the end application, or circuit construction technique. To aid the circuit designer in device selection, below are listed the Motorola broad range of RF small-signal amplifier transistors organized by package. Devices for other applications such as oscillators or switches are shown in the appropriate preceding tables.



TO-39 METAL CAN

Device Type	Gain–BW		Noise Figure			Gain		Maximum Ratings		
	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	BV_{CEO} V	I_C mA	P_T W
MM8000	0.7	50	2.7	200	10	11.4*	200	30	0.4	3.50
MM8001	0.9	50	2.7	200	10	11.4*	200	30	0.4	3.50
2N5109	1.2	50	3.0	200	10	11	216	20	400	2.50
2N5943	1.2	50	3.4	200	30	11.4*	200	30	400	3.50
MRF525†	2.5	50	4.0	400	–	13	400	35**	150	2.50
MRF517	2.7	60	7.5	300	50	10*	300	35**	150	2.50

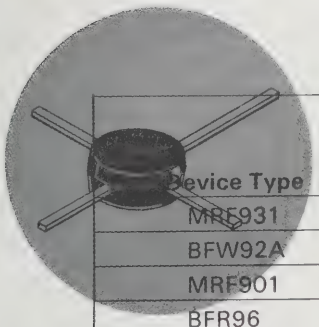
†Grounded Emitter TO-39. *Typ **BV_{CBO}



TO-72 METAL CAN

Device Type	Gain–BW		Noise Figure			Gain		Maximum Ratings		
	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	BV_{CEO} V	I_C mA	P_T mW
2N5031	1.0	5.0	2.5	450	1.0	14	450	10	20	200
2N5032	1.0	5.0	3.0	450	1.0	14	450	10	20	200
2N4958*	1.0	2.0	3.3	450	2.0	16	450	30	30	200
2N4959*	1.0	2.0	3.8	450	2.0	15	450	30	30	200
2N5829*	1.2	2.0	2.5	450	2.0	17	450	30	30	200
2N4957*	1.2	2.0	3.0	450	2.0	17	450	30	30	200
MRF501	1.2	5.0	4.0	200	1.5	15**	200	15	50	200
MRF502	1.2	5.0	4.0	200	1.5	15**	200	15	50	200
2N6305	1.2	10	5.5	450	2.0	12	450	15	50	200
BFX89	1.2	25	6.5	500	2.0	19	200	15	50	200
BFY90	1.4	25	5.0	500	2.0	21	200	15	50	200
2N5179	1.4	10	4.5	200	1.5	15	200	12	50	200
2N6304	1.4	10	4.5	450	2.0	15	450	15	50	200
2N3839	1.6	8.0	3.9	450	1.5	12.5	450	15	40	200
2N2857	1.6	8.0	4.1	450	1.5	12.5	450	15	40	200
MRF904	4.0	15	1.5	450	5.0	16	450	15	30	200
MRF914	4.5	20	2.0	500	5.0	15	500	12	40	200

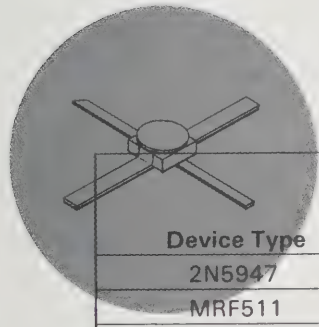
*PNP **Typ



PLASTIC — SOE — CASE 317-01/317A-01

Device Type	Gain—BW		Noise Figure			Gain		Maximum Ratings		
	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	BV_{CEO} V	I_C mA	P_T mW
MRF931	3.0	1.0	3.8	500	0.25	16*	500	5.0	5.0	50
BFW92A	4.0	25	2.5	500	2.0	16*	500	5.0	50	190
MRF901	4.5	15	2.0	1000	5.0	10	1000	15	30	375
BFR96	4.5	50	2.0*	500	10	12	500	15	100	500
MRF961	4.5	50	2.0*	500	10	13.5	500	15	100	500
MRF911	5.0	30	2.5	1000	5.0	12.5*	1000	12	40	400
BFR90	5.0	14	2.4	500	2.0	18*	500	15	30	180
BFR91	5.0	30	1.9	500	2.0	16*	500	12	35	180

*Typ



CERAMIC — SOE — CASE 144D-06, 303-01

Device Type	Gain—BW		Noise Figure			Gain		Maximum Ratings		
	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	BV_{CEO} V	I_C mA	P_T mW
2N5947	1.5	75	3.8	200	50	10	250	30	400	5000
MRF511	2.1	80	7.3	200	50	10	250	25	250	5000
MRF902	4.5	15	2.0	1000	5.0	13*	1000	15	30	400
2N6603	4.5	15	2.0	1000	5.0	13*	1000	15	30	400
MRF962	4.5	50	2.0*	500	10	15	500	15	100	750
MRF912	5.0	30	2.5	1000	5.0	14	1000	12	50	500
2N6604	5.0	30	2.5	1000	5.0	14	1000	12	50	500

*Typ

LINEAR HYBRID AMPLIFIER MODULES

The Hybrid Modules listed are specified for amplifier applications in CATV distribution equipment, but are applicable wherever broadband low-distortion, low-noise amplification is required. These modules are also specified as wideband amplifiers for use in communications/instrumentation equipment operating in bands from 0.1 MHz to 1000 MHz.

CATV HYBRID MODULES

All-Gold metallization of Motorola's CATV Hybrid Modules enhances reliability by reducing the failures associated with dissimilar-metal bonding. Chip geometries are optimized to reduce distortion products, and hybrid structures are designed to produce "signature-free" response for long cascades.

35-Channel, +24 Vdc Supply

Device Type	Gain 40-300 MHz dB Min/Typ	Maximum Distortion Specifications				Noise Figure @ 300 MHz dB
		Output Level dBmV	2nd Order Test Note 1 dB	35-Channel Triple Beat dB	35-Channel Cross-Mod. dB	
MHW1121	11.6/12.0	+50	-68	-51	-51	7.0
MHW1122	11.6/12.0	+50	-70	-56	-56	8.0
MHW1171	16.6/17	+50	-68	-51	-51	7.0
MHW1172	16.6/17	+50	-70	-56	-56	8.0
MHW1182*	18.0/18.5	+50	-72	-80†	-57††	7.0
MHW1221	21.4/22	+50	-64	-51	-51	6.0
MHW1222	21.4/22	+50	-66	-55	-56	7.0
MHW1341	33/44	+48	-68	-55	-55	7.0
MHW1342	33/34	+48	-70	-58	-57	7.0
MHW1343**	33/34	+48	-64	-58	-57	6.0
MHW1344**	33/34	+48	-64	-58	-57	6.0
MHW1391	38/39	+48	-66	-55	-55	6.0
MHW1392	38/39	+48	-68	-58	-57	6.0

Note 1. Channels (2 and 13) @ R. *Operating Frequency Range = 5 to 120 MHz. **Two Section—Accessible Interstage. †3 Channel Triple Beat ††12 Channels @ P_{out} = +54 dBmV.

35-Channel, -24 Vdc Supply

MHW1171R	16.6/17	+50	-66	-51	-51	7.0
MHW1172R	16.6/17	+50	-68	-56	-56	8.0

53-Channel, +24 Vdc Supply

Device Type	Gain 40-400 MHz dB Min/Typ	Typical Distortion Specifications				Noise Figure @ 400 MHz dB
		Output Level dBmV	2nd Order Test Note 1 dB	53-Channel Triple Beat dB	53-Channel Cross-Mod. dB	
MHW4171	16.5/17	+46	-65	-55	-59	6.5
MHW4172	16.5/17	+46	-72	-58	-62	7.5

Note 1. Channels (2 and M6) @ M15.

GENERAL-PURPOSE 50 Ω — 100 Ω WIDEBAND MODULES

Device Type	Frequency Range MHz	Gain dB Min/Typ	Supply Voltage Vdc	Output Level 1 dB Compression mW/f (MHz)	Noise Figure @ 250 MHz dB
MHW590	10–400	32.5/34	24	800/200	5.0
MHW591	1.0–250	35/36.5	13.6	700/100	5.0
MHW592	1.0–250	34.5/36	24	900/100	5.0
MHW593	10–400	34/35.5	13.6	600/200	4.5

TO-39 WIDEBAND, 50 Ω MODULES

The MWA Series features excellent gain versus frequency flatness, temperature stability and are cascadable for high gain lineups. Construction techniques include thin film gold metal circuitry and hermetic TO-39 package.
MWA devices processed similarly to MIL-S-883, Method 5004.4, Class B, are available to special order.

Device Type	Frequency Range MHz	Gain dB Min/Typ	Supply Voltage Vdc	Output Level 1 dB Compression dBm Typ	Noise Figure (400 MHz) dB Typ
MWA110	0.1–400	13/14	2.9	–2.5	4.0
MWA120	0.1–400	13/14	5.0	+8.2	5.5
MWA130	0.1–400	13/14	5.5	+18	7.0
MWA210	0.1–600	9/10	1.75	+1.5	6.0
MWA220	0.1–600	9/10	3.2	+10.5	6.5
MWA230	0.1–600	9/10	4.4	+18.5	7.5
MWA310	0.1–1000	7/8	1.60	+3.5	6.5
MWA320	0.1–1000	7/8	2.9	+11.5	6.7
MWA330	0.1–1000	—/6.2	4.0	+15.2	9.0

HIGH RELIABILITY RF TRANSISTORS

The listed devices are active per QPL-19500 (Qualified Products List) as of May, 1980. Check with your local Motorola Sales Office or franchised Distributor for current qualification status and additions.

2N2857JAN	2N3960JAN
2N2857JTX	2N3960JTX
2N2857JTXV	2N3960JTXV
2N3375JAN	2N4957JAN
2N3375JTX	2N4957JTX
2N3375JTXV	2N4957JTXV
2N3553JAN	2N5109JAN
2N3553JTX	2N5109JTX
2N3553JTXV	2N5109JTXV
2N3866JAN	2N6603JAN
2N3866JTX	2N6603JTX
2N3866JTXV	2N6603JTXV
2N3866AJAN	2N6604JAN
2N3866AJTX	2N6604JTX
2N3866AJTXV	2N6604JTXV

TRANSISTOR COMPLEMENTS

The transistor complements listed are suitable for most applications requiring NPN and PNP devices of similar RF characteristics. If your application demands special matching of complementary transistors, please contact your local Motorola Sales Office or Motorola distributors.

NPN	PNP
2N2857	2N4958
2N3375	2N5161
2N3553	MM4019
2N3866	2N5160
2N3959, 2N3960	2N4260, 2N4261
2N3960JAN	MM4261H
2N5643	2N5162
2N6080	2N6094
2N6081	2N6095
2N6082	2N6096
2N6084	2N6097
2N5943	2N5583
MRF433	MRF432
MRF531	MRF532
MRF904	MM4049

RF FIELD-EFFECT TRANSISTORS

Silicon N-Channel JFETs and MOSFETs characterized for operation as amplifiers and mixers in the VHF/UHF bands are listed below. The selection tables are organized in ascending gain and frequency. Devices are offered in both plastic and hermetic metal can packages to provide the most cost effective FETs for all classes of equipment.

Silicon N-Channel Field-Effect Transistors

Device Type	Gain		Noise Figure		Maximum Ratings			Package
	dB Min	f MHz	NF dB Max	f MHz	V_{DS} V	I_D mA	P_D @ T_A = 25°C mW	
Single Gate MOSFETs								
3N128	13.5	200	5.0	200	20	50	330	TO-72
MFE3004	16	200	4.5	200	20	10	200†	TO-72
Dual Gate MOSFETs								
3N203	20	45	6.0	45	25	50	360	TO-72
3N213	27	45	4.0	45	35	50	360	TO-72
MFE130	17	105	5.0	105	25	30	300	TO-72
3N201	15	200	4.5	200	25	50	360	TO-72
MFE131	17	200	5.0	200	25	30	300	TO-72
MFE521	21	200	3.5	200	25	30	300	TO-72
3N211	24	200	3.5	200	27	50	360	TO-72
MFE132	12*	200/45	—	—	25	30	300	TO-72
3N202	15*	200/45	—	—	25	50	360	TO-72
3N212	21*	200/45	—	—	27	50	360	TO-72
3N209	10	500	6.0	500	25	30	300	TO-72
Junction FETs								
2N3823	—	—	2.5	100	30	10**	300	TO-72
MPF108	—	—	3.0	100	25	10**	310	TO-92
J308/9/10	16††	100	1.5††	100	25	10**	350	TO-92
2N5484	16	100	3.0	100	25	30	310†	TO-92
2N5485/6	18	100	2.0	100	25	30	310†	TO-92
2N5668/69/70	16	100	2.5	100	25	20	310	TO-92
2N4223/4	10	200	5.0	200	30	20	300	TO-72
2N4416	10	400	4.0	400	30	10**	300	TO-72
MFE2000/1	10	400	4.0	400	25	30	300†	TO-72
MPF256	12	400	4.0	400	30	10**	350	TO-92
U308/9/10	12††	450	3.0††	450	25	20**	500	TO-52

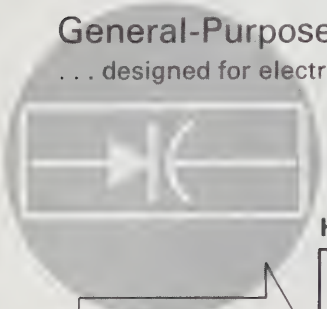
*Mixer Conversion Gain, f_{LO} = 245 MHz, f_{RF} = 200 MHz.
**I_G
†T_C = 25°C
††Typical

TUNING DIODES

The voltage variable capacitance diodes listed are designed for RF applications in all bands through UHF as well as general purpose electronic tuning and control. The product portfolio features plastic and hermetic glass packages, close tolerance units, hyper-abrupt devices, duals and AM tuning diodes. More information concerning tuning diodes for your specific design needs may be obtained through your local Motorola Sales Office or Distributor.

General-Purpose Tuning Diodes

. . . designed for electronic tuning and control applications.



LINE HIGHLIGHTS

HERMETIC-PACKAGE DEVICES

	• HIGH Q • CAPACITANCE TOLERANCE 10% and 5.0%	• THE PREMIUM 60-V GLASS LINE • HIGH Q GUARANTEED @ 4.0 V • CONTROLLED CR	• THE PREMIUM 30-V GLASS LINE • VERY HIGH Q • GUARANTEED HIGH CR • CAPACITANCE TOLERANCE 10%, 5.0% and 2.0%
	MAXIMUM WORKING VOLTAGE		
	60 VOLTS		30 VOLTS
	 CASE 51 DO-7	 **CASE 51** DO-7	 **CASE 51** DO-7

C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz		Cap Ratio 4-60 V Min	Q @ 4.0 V 50 MHz Min	Device Type (1)	Cap Ratio 4-60 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 2-30 V Min	Q @ 4.0 V 50 MHz Min	Device Type (2)
	6.8	2.7	350	1N5139, A				2.7	600	1N5461A
	8.2							2.8	600	1N5462A
	10	2.8	300	1N5140, A	3.0	500	MV1866	2.8	550	1N5463A
	12	2.8	300	1N5141, A	3.0	500	MV1868	2.8	550	1N5464A
	15	2.8	250	1N5142, A	3.0	400	MV1870	2.8	550	1N5465A
	18	2.8	250	1N5143, A	3.0	400	MV1871	2.9	500	1N5466A
	20							2.9	500	1N5467A
	22	3.2	200	1N5144, A	3.2	400	MV1872	2.9	500	1N5468A
	27	3.2	200	1N5145, A	3.2	300	MV1874	2.9	500	1N5469A
	33	3.2	200	1N5146, A	3.2	300	MV1876	2.9	500	1N5470A
	39	3.2	200	1N5147, A	3.2	300	MV1877	2.9	450	1N5471A
	47	3.2	200	1N5148, A	3.2	300	MV1878	2.9	400	1N5472A
	56							2.9	300	1N5473A
	68							2.9	250	1N5474A
	82							2.9	225	1N5475A
	100							2.9	200	1N5476A

(1) Add Suffix "A" for ±5.0% C_T tolerance.
(2) Substitute "B" Suffix for ±5.0% C_T, "C" Suffix for ±2.0% C_T.

HERMETIC-PACKAGE DEVICES (continued)

LINE HIGHLIGHTS	• HIGH Q • CAPACITANCE TOLERANCE 10%, 5.0% and 2.0% • CONTROLLED CR	• GENERAL-PURPOSE	• GENERAL-PURPOSE
	MAXIMUM WORKING VOLTAGE		
	30 VOLTS		20 VOLTS
	CASE 51 DO-7	CASE 51 DO-7	CASE 51 DO-7

C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	Cap Ratio 2-30 V Min	Q @ 4.0 V 50 MHz Min	Device Type (2)	Cap Ratio 4-25 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 2-20 V Min	Q @ 4.0 V 50 MHz Min	Device Type
6.8	2.5	450	1N5441A				2.0	300	MV1620
8.2	2.5	450	1N5442A				2.0	300	MV1622
10	2.6	400	1N5443A				2.0	300	MV1624
12	2.6	400	1N5444A				2.0	300	MV1626
15	2.6	400	1N5445A	1.8	30	MV830	2.0	250	MV1628
18	2.6	350	1N5446A	1.8	25	MV831	2.0	250	MV1630
20	2.6	350	1N5447A				2.0	250	MV1632
22	2.6	350	1N5448A	1.8	25	MV832	2.0	250	MV1634
27	2.6	350	1N5449A	1.8	25	MV833	2.0	200	MV1636
33	2.6	350	1N5450A	1.9	20	MV834	2.0	200	MV1638
39	2.6	300	1N5451A	1.9	20	MV835	2.0	200	MV1640
47	2.6	250	1N5452A	1.9	15	MV836	2.0	200	MV1642
56	2.6	200	1N5453A	1.9	15	MV837	2.0	150	MV1644
68	2.7	175	1N5454A	2.0	15	MV838	2.0	150	MV1646
82	2.7	175	1N5455A	2.0	10	MV839	2.0	150	MV1648
100	2.7	175	1N5456A	2.0	10	MV840	2.0	150	MV1650

(2) Substitute "B" Suffix for ±5.0% C_T, "C" Suffix for ±2.0% C_T.

PLASTIC-PACKAGE DEVICES

LINE HIGHLIGHTS

- LOW-COST, HIGH VOLUME
- LOWER COST
- GENERAL-PURPOSE

MAXIMUM WORKING VOLTAGE

30 VOLTS | 25 VOLTS

CASE 182

C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	Cap Ratio 2-30 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 1-10 V Min	Q @ 4.0 V 50 MHz Min	Device Type (1)
6.8	2.5	450	MV2101	1.9	300	MV2201
8.2	2.5	450	MV2102			
10	2.5	400	MV2103	2.0	200	MV2203
12	2.5	400	MV2104			
15	2.5	400	MV2105	2.0	200	MV2205
18	2.5	350	MV2106			
22	2.5	350	MV2107	2.0	150	MV2207
27	2.5	300	MV2108			
33	2.5	200	MV2109	2.0	150	MV2209
39	2.5	150	MV2110			
47	2.5	150	MV2111	2.0	100	MV2211
56	2.6	150	MV2112			
68	2.6	150	MV2113	2.0	100	MV2213
82	2.6	100	MV2114			
100	2.6	100	MV2115	2.0	50	MV2215

(1) C_T tolerance is ±20%.

High-Capacitance Tuning Diodes

. . . for tuning applications in lower RF frequencies.

LINE HIGHLIGHTS		• HIGH CAPACITANCE • GENERAL-PURPOSE			• LOWER COST • GENERAL-PURPOSE			• HYPER-ABRUPT • HIGH TUNING RATIO		
		MAXIMUM WORKING VOLTAGE								
		20 VOLTS						12 VOLTS		
		CASE 146 DO-14			CASE 182			CASE 51 DO-7		
		Cap Ratio 2-20 V Min	Q @ 4.0 V 20 MHz Min	Device Type	Cap Ratio 2-20 V Min	Q @ 4.0 V 20 MHz Min	Device Type	Cap Ratio 2-10 V #1-10 V Min	Q @ 2.0 V 1.0 MHz Min	Device Type
C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V = 2.0 V‡ = 1.0 V• f = 1.0 MHz	120	2.6	250	MV1652	2.3	250	MV2301	10	200	MV1404‡
	150	2.6	250	MV1654	2.3	250	MV2302	10	200	MV1403‡
	180	2.6	200	MV1656	2.3	200	MV2303			
	200	2.6	200	MV1658	2.3	200	MV2304			
	220	2.6	150	MV1660	2.3	150	MV2305			
	250	2.3	150	MV1662	2.3	150	MV2306	10	200	MV1405‡
	270	2.3	100	MV1664	2.3	100	MV2307			
	330	2.3	100	MV1666	2.3	100	MV2308			
	550							14#	200	MV1401•

FM Radio and TV Hyper-Abrupt Tuning Diodes

. . . designed for use in VHF and UHF tuners and FM radio, providing solid-state reliability in replacement of mechanical tuning methods.

LINE HIGHLIGHTS

• HIGH Q • GUARANTEED CAPACITANCE RANGE • MONOLITHIC DUAL	• LOW INDUCTANCE • MINI-L PACKAGE	• SMALL GLASS PACKAGE FOR HERMETICITY AND RELIABILITY

MAXIMUM WORKING VOLTAGE

32 VOLTS	30 VOLTS	
CASE 29-02 TO-92	**CASE 226**	**CASE 299** Similar to DO-35

C_T, Nominal Capacitance pF		V_R	Cap Ratio 3-30 V	Q @ 3.0 V 100 MHz	Device	Cap Ratio 3-25 V	Q @ 9.0 pF 100 MHz	Device	Cap Ratio 3-25 V	Q @ 3.0 V 50 MHz	Device
Min	Max	Volts	Min	Min	Type	Min	Min	Type	Min	Min	Type
2.3	2.8	25				4.0	225	BB105A			
2.0	2.3	25				4.5	225	BB105B			
1.8	2.8	25				4.0	150	BB105G			
12.5	15.5	4.0							3.4(3)	100(4)	MV310(5)
26	32	3.0				5.0	280(1)	MV109	5.0	280 typ	MV309
26	32	3.0				5.0	200(1)	MV209(2)			
34	39	3.0	2.5	100	MV104G						
37	42	3.0	2.5	100	MV104						

(1) Q @ V_R = 3.0 V, f = 50 MHz
(2) Case 182 — Two-lead TO-92
(3) Cap Ratio over 1-25 V
(4) Q @ V_R = 4.0 V, f = 100 MHz.
(5) MWV = 28 V.

AM Tuning Diodes

. . . designed for electronic tuning of AM radios, receivers and general AM frequency control.

LINE HIGHLIGHTS

- HIGH CAPACITANCE RATIO
- GUARANTEED DIODE CAPACITANCE

CASE 182-03

C_T NOMINAL CAPACITANCE pF V_R = 1.0 V f = 1.0 MHz		V_{BR} Min	Cap Ratio Min @	V_R Volts	Q @ 1.0 V 1.0 MHz Min	Device Type
	460	15	12	1–9	150	MVAM109
	500	18	15	1–15	150	MVAM115
		28	15	1–25	150	MVAM125

HOT-CARRIER DIODES

Hot-Carrier diodes are ideal for VHF and UHF mixer and detector applications as well as many higher frequency applications. They provide stable electrical characteristics by eliminating the point-contact diode presently used in many applications. Motorola has the capability of supplying these devices in a variety of packages.

$V_{(BR)R}$ I_R = 10 μA Volts Min	C_T V_R = 0 V, f = 1.0 MHz (1) V_R = 15 V, f = 1.0 MHz(2) V_R = 20 V, f = 1.0 MHz (3) pF Max	V_F I_F = 10 mA Volts Max	I_R V_R = 3.0 V (4) V_R = 15 V (5) V_R = 25 V (6) V_R = 35 V (7) μA Max	NF f = 1.0 GHz dB Max	Device Type	Case
4.0	1.0(1)	0.6	0.25 (4)	7.0	MBD101	182-02
4.0	1.0(1)	0.6	0.25(4)	7.0	MBD102	226
20	1.5(2)	0.6	200(5)		MBD201	182-03
30	1.5(2)	0.6	200(6)		MBD301	182-03
50	1.0(3)	1.2	200(6)		MBD501	182-02
50	1.0(3)	1.2	200(6)		MBD502	226
70	1.0(3)	1.2	200(7)		MBD701	182-02
70	1.0(3)	1.2	200(7)		MBD702	226

CASE 182

CASE 226

PIN SWITCHING DIODES

. . . designed for VHF band switching and general-purpose switching.

CASE 226

CASE 299
Similar to DO-35

$V_{(BR)R}$ I_R = 10 μAdc Volts Min	R_S I_F = 10 mAdc Ohms f = 100 MHz Max	C_T V_R = 20 V f = 1.0 MHz pF Max	L_S f = 250 MHz nH Typ	C_C f = 1.0 MHz pF Typ	Device Type	Case
35	0.7	1.0	3.0	0.1	MPN3401	226
35	0.6	2.0	3.0	0.1	MPN3402	226
35	0.6	2.0		0.4	MPN3500	299
20	1.0	2.0(1)		0.4	MPN3503	299
20	0.5	2.0(1)		0.4	MPN3504	299

(1) V_R = 15 V.

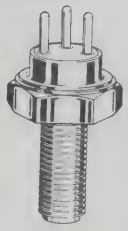
PACKAGE OVERVIEW

CASE 20-03
(TO-72)

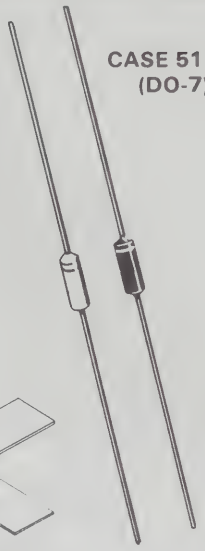
CASE 22-03
(TO-18)

CASE 26-03
(TO-46)

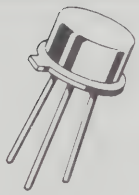
CASE 29-02
(TO-92)



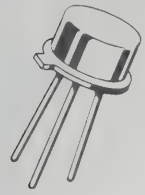
CASE 36-03
(TO-60)



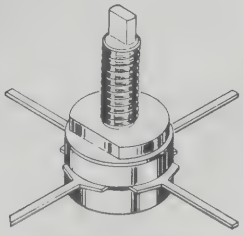
CASE 51-02
(DO-7)



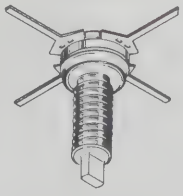
CASE 79-02
(TO-39)



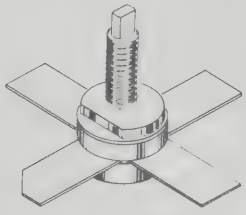
CASE 79-03



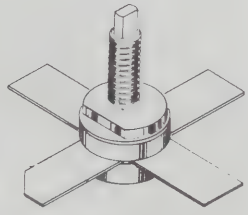
CASE 144B-05



CASE 144D-06

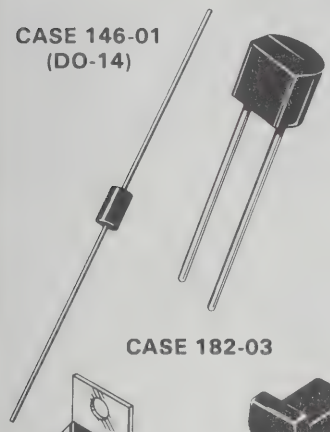


CASE 145A-09

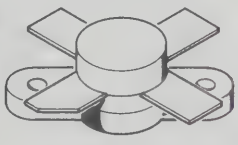


CASE 145A-10

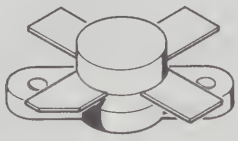
CASE 146-01
(DO-14)



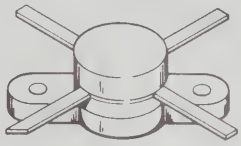
CASE 182-03



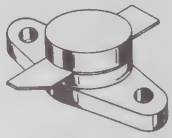
CASE 211-07
CASE 211-09



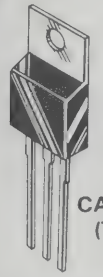
CASE 211-08
CASE 211-11



CASE 211-10

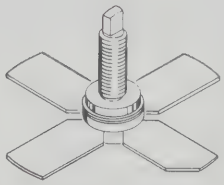


CASE 215-02

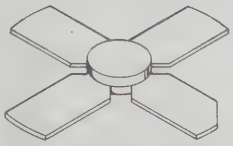


CASE 221A-02
(TO-220AB)

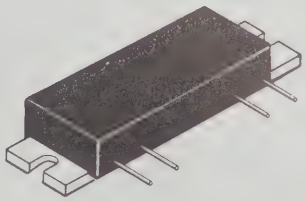
CASE 226-01



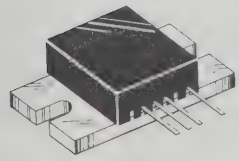
CASE 244-04



CASE 249-05

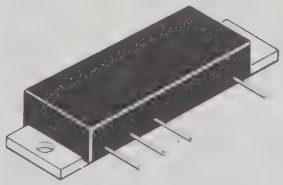


CASE 297-03

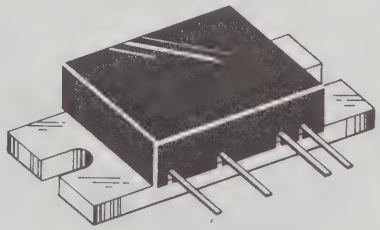


CASE 297A-03

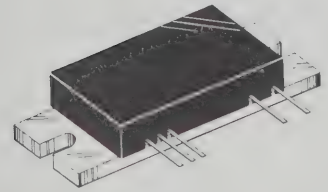
CASE 299-02
(DO-204AH)



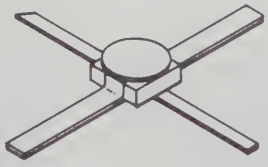
CASE 301-01



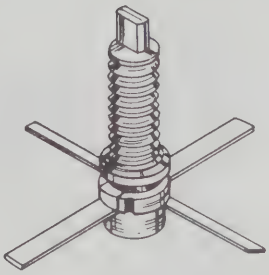
CASE 301A-03



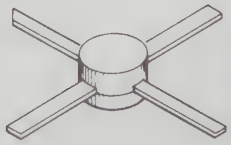
CASE 301B-01



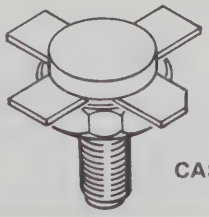
CASE 303-01



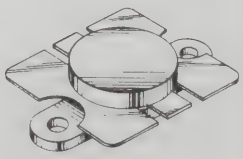
CASE 305-01



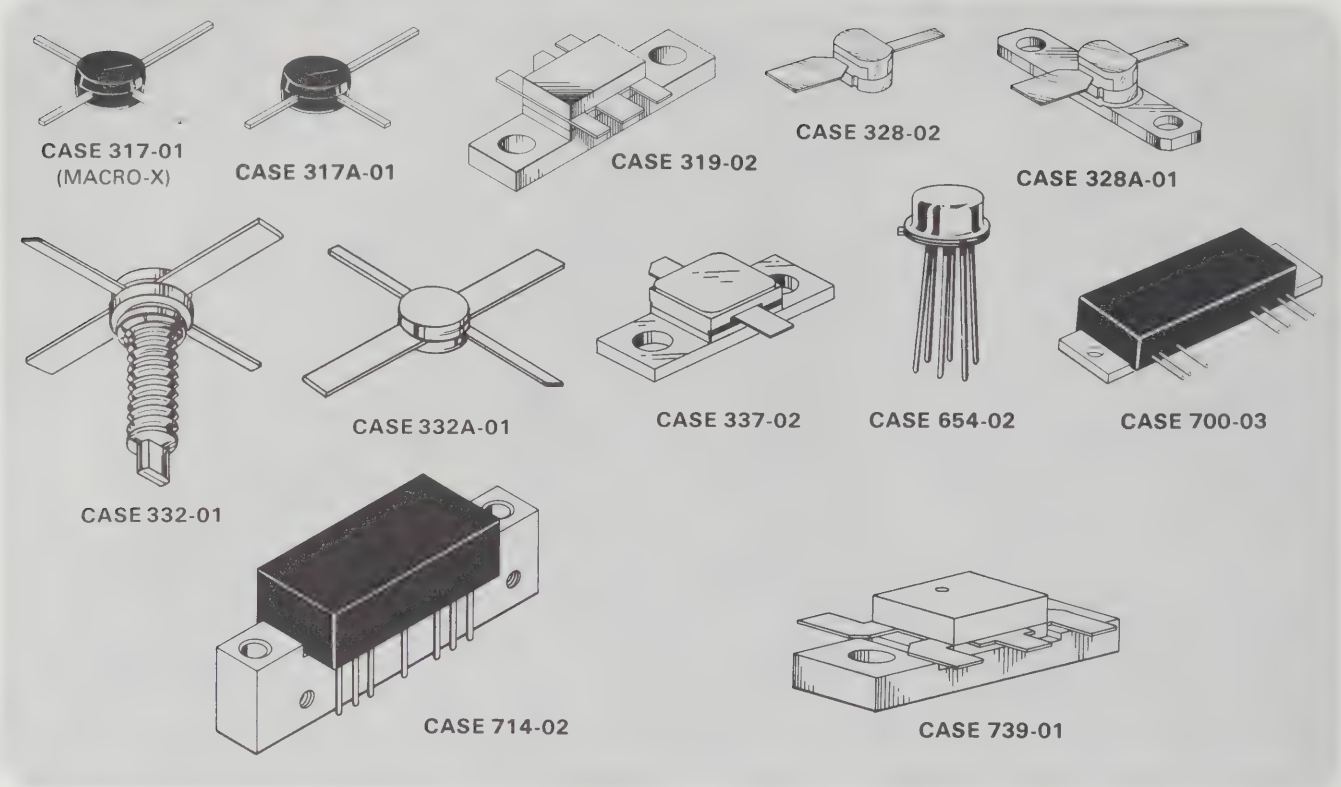
CASE 305A-01



CASE 307-01



CASE 316-01



For Mounting Information see:
AN-555 — Mounting Stripline-Opposed-Emitter (SOE) Transistors
AN-778 — Mounting Techniques for Power Semiconductors.

PACKAGE INFORMATION

Stud Torque

Condition	TO-102 6-32	SOE 8-32	SOE 10-32	TO-60 10-32	SOE 1/4-28
For repeated use (inch—lb)	1.8	5.0	8.5	12	35
One time only (inch—lb)	2.1	6.5	11.0	15	35

D flat alignment ±5° from collector lead

Mounting Hardware

6-32 Stud	Part Number
Hex Nut	BO9490A006
Lock Washer	B52200F004
Flat Washer	B51567F036
8-32 Stud	
Hex Nut	B51568F042
Lock Washer	B51566F030
Flat Washer	B51567F038
10-32 Stud	
Hex Nut	B51568F015
Lock Washer	B51566F020
Flat Washer	B51567F009
1/4-28 Stud	
Hex Nut	B51568F029
Lock Washer	B51566F011
Flat Washer	B51567F025

CROSS REFERENCE

PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
1N3182	1N3182	
1N3551		MV1642
1N3552		1N5447A
1N3554		1N5141A
1N3555		1N5144
1N3556		1N5148
1N3557		1N5144
1N3627		1N5447A
1N3628		1N5452A
1N3945		MV1632
1N3946		1N5457A
1N3947		1N5474A
1N4085		1N5142
1N4091		1N5461A
1N4786		1N5441A
1N4787		1N5442A
1N4788		1N5443A
1N4789		1N5444A
1N4790		1N5445A
1N4791		1N5446A
1N4792		1N5448A
1N4793		1N5449A
1N4794		1N5450A
1N4795		1N5451A
1N4796		1N5452A
1N4797		1N5453A
1N4798		1N5454A
1N4799		1N5455A
1N4800		1N5446A
1N4801		1N5139
1N4802		1N5462A
1N4803		1N5140
1N4804		1N5141
1N4806		1N5143
1N4807		1N5144
1N4808		1N5145
1N4809		1N5146
1N4810		1N5147
1N4811		1N5148
1N4812		1N5148
1N4813		1N5454A
1N4814		1N5455A
1N4815		1N5456A
1N5139	1N5139	
1N5140	1N5140	
1N5141	1N5141	
1N5142	1N5142	
1N5143	1N5143	
1N5144	1N5144	
1N5145	1N5145	
1N5146	1N5146	
1N5147	1N5147	
1N5148	1N5148	
1N5441A	1N5441A	
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1N5443A,B,C	1N5443A,B,C	
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1N5445A,B,C	1N5445A,B,C	
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1N5447A,B,C	1N5447A,B,C	
1N5448A,B,C	1N5448A,B,C	
1N5449A,B,C	1N5449A,B,C	
1N5450A,B,C	1N5450A,B,C	
1N5451A,B,C	1N5451A,B,C	
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1N5454A,B,C	1N5454A,B,C	
1N5455A,B,C	1N5455A,B,C	
1N5456A,B,C	1N5456A,B,C	
1N5461A,B,C	1N5461A,B,C	
1N5462A,B,C	1N5462A,B,C	
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1N5464A,B,C	1N5464A,B,C	
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1N5466A,B,C	1N5466A,B,C	
1N5467A,B,C	1N5467A,B,C	
1N5468A,B,C	1N5468A,B,C	
1N5469A,B,C	1N5469A,B,C	
1N5470A,B,C	1N5470A,B,C	
1N5471A,B,C	1N5471A,B,C	
1N5472A,B,C	1N5472A,B,C	
1N5473A,B,C	1N5473A,B,C	
1N5474A,B,C	1N5474A,B,C	
1N5475A,B,C	1N5475A,B,C	
1N5476A,B,C	1N5476A,B,C	
1N5681		1N5461A
1N5682		1N5462A
1N5683		1N5463A
1N5684		1N5464A
1N5685		1N5465A
1N5686		1N5457A
1N5687		1N5458A
1N5688		1N5469A
1N5689		1N5470A
1N5690		1N5471A
1N5691		1N5472A
1N5692		1N5473A
1N5693		1N5474A
1N5694		1N5475A
1N5695		1N5476A
1N5696		1N5461A
1N5697		1N5462A
1N5698		1N5463A
1N5699		1N5464A
1N5700		1N5465A
1N5701		1N5467A
1N5702		1N5468A
1N5703		1N5469A
1N5704		1N5470A
1N5705		1N5471A
1N5706		1N5472A
1N5707		1N5473A
1N5708		1N5474A
1N5709		1N5475A
1N5710		1N5476A
1N5711		MBD701/702
1N5712		MBD201
1N5713		MBD201
1N5765		MBD301
1N5765		MBD301
1N5766		MBD301
1N5766		MBD301
1N5767		MBD201
1N5767		MBD201
1N6263		MBD701
2N1491		MRF531
2N2631		2N3553
2N2857	2N2857	
2N2876		2N3375
2N2947		2N5641
2N3118		2N3553
2N3119		MRF531
2N3137	2N3137	
2N3287	2N3287	
2N3288	2N3287	
2N3289	2N3287	
2N3290	2N3287	
2N3293	2N3287	
2N3296		2N5641
2N3309A		2N3553
2N3375	2N3375	
2N3478		2N5179
2N3553	2N3553	
2N3570	2N5032	
2N3571		2N5032
2N3572		2N5032
2N3600		2N5179
2N3632	2N3632	
2N3733		2N3632
2N3818		2N3632
2N3839	2N3839	
2N3866	2N3866	
2N3880		2N5032
2N3925		2N5589
2N3926	2N3926	
2N3927	2N3927	
2N3948	2N3948	
2N3950	2N3950	
2N3959	2N3959	
2N3960	2N3960	
2N3961		2N5641
2N4012	2N4012	
2N4040	2N5636	
2N4041	2N5635	
2N4072	2N4072	
2N4073	2N4073	
2N4127	2N6081	
2N4128	2N6082	
2N4130	2N4130	
2N4130		MRF463
2N4192		MRF531
2N4193		MRF531
2N4223	2N4223	
2N4416	2N4416	
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CA2200R	MHW1172R	
CA2300	MHW1221	

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PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
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CA2876	MHW1221	
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CA418	MHW1182	
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CA636	MHW1342	
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CA804	MHW590	
CA860	MHW590	
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MM1681	2N6081	
MM1713	2N4072	
MM1943	2N4072	
MM1945	2N4072	
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MM4023	2N6097	
MM439		2N4959
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MM5177	MRF5177	
MM8002	2N5943	
MM8003	MRF511	
MM8004	MRF8004	
MM8006	2N5031	
MM8007	2N5032	
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MM8011		MRF905
MM8012	2N5947	
MM8020	2N5836	
MM8021	2N5837	
MM8023		2N5943
MPF256	MPF256	
MRAL1720-2	MRF2003M	
MRAL1720-20		MRF2016M
MRAL1720-5	MRF2005M	
MRAL1720-9	MRF2010M	
MRAL2023-1.5		MRF2003M
MRAL2023-12	MRF2016M	
MRAL2023-3	MRF2003M	
MRAL2023-6	MRF2010M	
MRA1720-2		MRF2003M
MRA1720-20		MRF2016M
MRA1720-5		MRF2005M
MRA1720-9		MRF2010M
MRF201	2N6255	
MRF203		MRF245
MRF305	MRF325	
MRF306	2N6439	
MRF415	2N6366	
MRF416	2N6367	
MRF417	2N6368	

PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
MRF418	MRF460	
MRF419	2N6370	
MRF420	MRF454	
MRF451	MRF453	
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MRF504		MRF511
MRF5175		MRF321
MRF5176		MRF323
MRF5178		2N6439
MRF519		MRF517
MRF601	2N6256	
MRF602	2N6136	
MRF605	2N6439	
MRF618	MRF641	
MRF619	MRF644	
MRF620	MRF644	
MRF621	MRF646	
MRF901		2N6603
MRF902	2N6603	
MRF911		2N6604
MRF912	2N6604	
MSC1000M	MRF1000MA/B	
MSC1002M	MRF1002MA/B	
MSC1004M	MRF1004MA/B	
MSC1015M	MRF1015MA/B	
MSC1035M	MRF1035MA/B	
MSC1075M	MRF1090MA/B	
MSC1090M	MRF1090MA/B	
MSC1150M	MRF1150MA/B	
MSC1175M	MRF1150MA/B	
MSC1250M	MRF1250M	
MSC1325M	MRF1325M	
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MSC2003	MRF2003	
MSC2005	MRF2005	
MSC2010	MRF2010	
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MSC82005	MRF2005	
MSC82005M	MRF2005M	
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MSC82012M	MRF2010M	
MSC82020M	MRF2016M	
MSC82201	MRF2001	
MSC82203	MRF2003	
MSC82304M	MRF2005M	
MSC82310M	MRF2010M	
MSC82313M	MRF2016M	
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MV2114		MV2114
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MV2308		MV2308
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MV3102		MV3102
MV3103		MV3103
MV3140		BB105B
MV3141		BB105A
MV3142		BB105G
MV830		MV830
MV831		MV831
MV832		MV832
MV833		MV833
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MV835		MV835
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MV837		MV837
MV838		MV838
MV839		MV839
MV840		MV840
MX1.5		MHW401
MX12	MHW710	
MX15	MHW710	
MX7.5	MHW709	
M57704H		MHW710-2
M57704L		MHW710-1
M57704M		MHW710-1
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M57710		MHW613
M57712		MHW613
M57715		MHW612
NE02103		2N6604
NE02107	2N6603	
NE02108		2N6603
NE02112	MRF904	
NE02133	MMBR901	
NE02135		MRF901
NE0801		MRF838
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NE0810		MRF840
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NE22154		MRF511
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PC141		1N5139
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PG215		MV1868
PG222		MV1872
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PG247		MV1878
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PG315		MV1868
PG322		MV1872
PG333		MV1876
PG339		MV1877
PG347		MV1878
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PH0406H		MRF5175
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PH0506H	MRF321	
PH0512H	MRF321	
PH0525H	MRF325	
PH0550H	2N6439	
PH8193		MRF905
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PT3503		MRF232
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PT3570	2N5947	
PT3571	2N5943	
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PT4555		MRF234
PT4556		MRF450A
PT4570	2N5947	
PT4572A	2N5947	
PT4574	MRF511	
PT4578	MRF517	
PT4579	2N5943	
PT5695		MRF233
PT5701	MRF402	
PT8549		2N6081
PT8551	2N3553	
PT8717	MRF231	
PT8740		MRF629
PT8740A	MRF607	
PT8769	MRF233	
PT8809	2N5944	

CROSS REFERENCE (continued)

PT8810 —V47E

PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
PT8810	2N5945	
PT8811	2N5946	
PT8825		2N6136
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PT8851		2N5847
PT8851A		2N5847
PT8852		2N5848
PT8852A		2N5848
PT8854	MRF492	
PT8854A	MRF492A	
PT8861		MRF232
PT8861A		MRF232
PT8863		MRF234
PT8863A	MRF234	
PT8864		2N6083
PT8864A		2N6083
PT8866	MRF237	
PT8871		2N6080
PT8871A		2N6080
PT8873F	MRF221	
PT8874F	MRF224	
PT8877	MRF237	
PT8889	MRF526	
PT9700	MRF5174	
PT9701	MRF5175	
PT9702	MRF323	
PT9703	MRF321	
PT9704		MRF5177A
PT9704A		MRF5177A
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PT9732	2N5641	
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PT9734	MRF314	
PT9776	MRF455	
PT9776A	MRF455A	
PT9780		MRF464
PT9780A		MRF464A
PT9782		MRF317
PT9782A		MRF317
PT9783		MRF466
PT9784	MRF455	
PT9784A	MRF455A	
PT9785	MRF421	
PT9787	2N6370	
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PT9788A	MRF401	
PT9790	MRF428	
PT9790A	MRF428A	
PT9795	MRF433	
PT9795A		2N6081
PT9796	MRF449	
PT9796A	MRF449A	
PT9797	MRF450	
PT9797A	MRF450A	
PT9847		MRF412
RF1003	MRF221	
RF1004	MRF223	
RF2081	MRF216	
RF2092		MRF460
RF2123	MRF238	
RF2125		MRF450
RF2127	MRF245	
RF2135	MRF223	
RF2142	2N6367	
RF2143		MRF454
RF2144	MRF224	
RF2146	MRF476	
RF2147	MRF475	
RF400		BB105G
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R47M13	MHW710	
R47M15	MHW710	
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SD1006	2N5943	
SD1012	2N5590	
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SD1015	MRF315	
SD1018-4	MRF224	
SD1019		MRF317
SD1019-5	2N6166	
SD1020	MRF402	
SD1020-6	MRF313A	
SD1020-7	MRF313	
SD1068		MRF230
SD1069		2N5847
SD1074	MRF453	
SD1076	MRF454	
SD1077	MRF8004	
SD1078	MRF454	
SD1080	MRF207	
SD1080-2	MRF628	
SD1080-4	MRF604	
SD1080-6	MRF627	
SD1080-7	MRF626	
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SD1089	MRF646	
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SD1143	MRF212	
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SD1148	MRF321	
SD1149	MRF323	
SD1166	MRF403	
SD1167	2N5847	
SD1168	2N5848	
SD1169	2N5849	
SD1174	2N6255	
SD1177		2N5589
SD1200	2N3866	
SD1212-4		MRF476
SD1214-4		MRF475
SD1216	2N5591	
SD1218	MRF209	
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SD1224-4		MRF466
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SD1244-6		2N5642
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SD1256		2N5589
SD1262	MRF226	
SD1272	MRF239	
SD1285	MRF406	
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SD1299	MRF326	
SD1300	BFY90	
SD1303	2N3839	
SD1308	MRF905	
SD1315	MRF511	
SD1347-7	MRF402	
SD1377		MRF1000MA/B
SD1402		MRF559
SD1403	MRF428	
SD1404	MRF427	
SD1405	MRF458	
SD1407		MRF422
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SD1424	MRF449A	
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SD1428	MRF216	
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SD1451	MRF453	
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SD1461		MRF313A
SD1462		MRF313A
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SD1465		MRF5177A
SD1466		MRF326
SD1467	MRF326	
SD1468	MRF327	
SD1469		MRF328
SD1480		MRF317
SD1487	MRF316	
SD1510		MRF1035MA/B
SD1511		MRF1035MA/B
SD1512		MRF1090MA/B
SD1513		MRF1090MA/B
SD1514		MRF1150MA/B
S10-12	MRF433	
S10-28	2N6370	
S100-12	MRF421	
S100-28	MRF422	
S100-50	MRF428	
S15-50	MRF427	
S175-28		MRF422
S175-50		MRF428
S50-12	MRF450	
S50-28	MRF464	
S80-12	MRF454	
TPR10		MRF1015MB
TPR150		MRF1150MB
TPR50		MRF1090MB
TP312	BFR96	
TP312	BFR96	
TP390	BFW92A	
TP393	BFR91	
TP394	BFR96	
TP491	BFR91	
TRW2001	MRF2001	
TRW2003	MRF2003	
TRW2005	MRF2005	
TRW2010	MRF2010	
UC155		2N4416
UC210		2N4416
UC734		2N4416
U308	U308	
U309	U309	
U310	U310	
VP20A		MHW612
VP20B		MHW612
V020	MRF905	
V10		1N5443A
V10E		1N5140
V100		MV840
V100E		1N5476A
V12		1N5444A
V12E		1N5141
V15		MV830
V15E		1N5142
V20		1N5447A
V20E		1N5467A
V27		MV833
V27E		1N5145
V33		MV834
V33E		1N5146
V39		MV835
V39E		1N5147
V47		MV836
V47E		1N5148

PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
V56		MV857						
V56E		1N5473A						
V68		MV838						
V68E		1N5474A						
V7		1N5441A						
V7E		1N5138						
V82		MV839						
V82E		1N5457A						
V900		1N5456A						
V900E		1N5476A						
V907		1N5441A						
V907E		1N5139						
V910		1N5443A						
V910E		1N5140						
V912		1N5444A						
V912	2N6603							
V915		1N5445A						
V920		1N5447A						
V927		1N5449A						
V933		1N5450A						
V939		1N5451A						
V956		1N5453A						
V968		1N5454A						
V982		1N5455A						
V996		2N6603						

LITERATURE

Application Notes and Engineering Bulletins of special interest to designers of RF equipment are listed below, and are available on request through Motorola sales offices or distributors.

AN-139A	Understanding Transistor Response Parameters
AN-215A	RF Small-Signal Design Using 2-Port Parameters
AN-267	Matching Network Designs with Computer Solutions
AN-282A	Systemizing RF Power Amplifier Design
AN-548A	Microstrip Design Techniques for UHF Amplifiers
AN-555	Mounting Stripline-Opposed-Emitter (SOE) Transistors
AN-577	Design Techniques for an 80-Watt, 175 MHz Transmitter for 12.5 V Operation
AN-585	VHF Power Amplifiers Using Paralleled Output Transistors
AN-593	Broadband Linear Power Amplifiers Using Push-Pull Transistors
AN-595	25-Watt and 10-Watt VHF Marine Band Transmitters
AN-721	Impedance Matching Networks Applied to RF Power Transistors
AN-728	13 Watt-Microstrip Amplifier for 220–225 MHz Operation
AN-749	Broadband Transformers and Power Combining Techniques for RF
AN-758	A Two-Stage 1 kW Solid-State Linear Amplifier
AN-762	Linear Amplifiers for Mobile Operation
AN-778	Mounting Techniques for Power Semiconductors
AN-779	Low-Distortion 1.6 to 30 MHz SSB Driver Designs
AN-790	Thermal Rating of RF Power Transistors
AN-791	A Simplified Approach to VHF Power Amplifier Design
AN-793	"A 15-Watt AM Aircraft Transmitter Power Amplifier Using Low Cost Plastic Transistors"

EB-17A	Simple VHF Broadband Design Uses CQ Transistor Lineup
EB-27A	Get 300 Watts PEP Linear Across 2 to 30 MHz from This Push-Pull Amplifier
EB-29	The Common-Emitter TO-39 and Its Advantages
EB-32	A Complementary Symmetry Amplifier for 2 to 30 MHz SSB Driver Applications

LITERATURE (continued)

EB-38	Measuring the Intermodulation Distortion of Linear Amplifiers
EB-46	A Single-Device, 80-Watt, 50-Ohm VHF Amplifier
EB-53	Two VHF Highband Gain Blocks Form 20-dB, 30-Watt Amplifier Chain
EB-63	140 W (PEP) Amateur Radio Linear Amplifier 2–30 MHz
EB-67	A 100-Watt PEP 420–450 MHz Pull-Pull Linear Amplifier
EB-70A	Frequency Multiplication Simplified by Internal Faraday Shields in MRF629
EB-74	A 10-Watt 225–400 MHz Amplifier — MRF331
EB-77	A 60-Watt 225–400 MHz Amplifier — 2N6439
EB-89	A 1-Watt, 2.3 GHz Amplifier
EB-90	Low-Cost VHF Amplifier Has Broadband Performance
EB-92	25-W Add-On Amplifier for Hand Held VHF Radios

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